IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:		Atty. Docket No.:	006020.00008
Philip Victor HARMAN			
Serial No.:	09/586,869	Group Art Unit:	2624
Filed:	June 5, 2000	Examiner:	Kim, C.
For:	IMPROVED IMAGE CONVERSION AND ENCODING TECHNIQUES	Confirmation No.:	7648

APPEAL BRIEF

U.S. Patent and Trademark Office
Customer Service Window, Mail Stop Appeal Brief - Patents
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir:

This is an Appeal Brief in accordance with 37 C.F.R. § 41.37 in support of appellants' November 30, 2006 Notice of Appeal. Appeal is taken from the Final Office Action mailed June 1, 2006, and the Advisory Action mailed October 11, 2006. Please charge any necessary fees in connection with this Appeal Brief to our Deposit Account No. 19-0733.

REAL PARTY IN INTEREST
37 C.F.R. § 41.37(c)(1)(i)

The owner of this application, and the real party in interest, is Dynamic Digital Depth Research Pty Ltd.

RELATED APPEALS AND INTERFERENCES
37 C.F.R. § 41.37(c)(1)(ii)

There are no related appeals and interferences.

STATUS OF CLAIMS
37 C.F.R. § 41.37(c)(1)(iii)

Claims 1-3, 5-14, 18, 23, 27-33 and 43-44 are rejected, claims 15-17, 24-26 and 36-42 are canceled, and claims 45-51 have been allowed and claims 4, 19-22, 34 and 35 have been objected, but would be allowable if rewritten in independent form to include the subject matter of their base claim and any intervening claims.

Only the rejected claims 1-3, 5-14, 18, 23, 27-33 and 43-44 are shown in the attached appendix.

Appellants hereby appeal the rejection of claims 1-3, 5-14, 18, 23, 27-33 and 43-44.

STATUS OF AMENDMENTS
37 C.F.R. § 41.37(c)(1)(iv)

All prior amendments to the claims have been entered.

SUMMARY OF CLAIMED SUBJECT MATTER
37 C.F.R. § 41.37(c)(1)(v)

In making reference herein to various portions of the specification and drawings in order to explain the claimed invention, Appellants do not intend to limit the claims; all references to the specification and drawings are illustrative unless otherwise explicitly stated. Appellants note that all references to the specification are to the Substitute Specification filed February 4, 2004.

The present invention is directed to "converting two-dimensional (2D) images for further encoding, transmission and decoding for the purpose of stereoscopic image display." *Specification*, para. [02], lines 2-4.

In a 2D image, objects can be identified using visual inspection by an operator. *Specification*, para. [30], lines 1-2. Additionally, objects can be identified automatically using a computer, or semi-automatically in which an operator assists the computer to locate the objects

by informing the computer as to the nature of the image. *Specification*, para. [31], lines 1-3, and para. [33], lines 1-3. To identify an object automatically, a computer uses characteristics such as "object size, color, speed of motion, shading, texture, brightness, obscuration, focus as well as differences between previous and current and future images." *Specification*, para. [32], lines 1-3. Further, an operator can use object identifying information generated by another operator who considered the same image or who previously converted similar scenes in an image. *Specification*, para. [35], lines 1-3. Each of the above referenced techniques is an example of identifying at least one object within a 2D image without using distance measurement data as recited in claim 1. After identifying each object or groups of objects in the 2D image, the operator can tag each object or group by using a mouse, pen, stylus or other pointing device and assigning a unique number to the object. *Specification*, para. [30], lines 2-4. This action of assigning a unique number to the object provides support for allocating an identifying tag to the at least one object as recited in claim 1 and also allocating an object identifier to an object without using distance measurement data as called for in claim 27. The unique number may be generated by a computer or manually created by the operator. *Specification*, para. [30], lines 4-5.

"The outline of an object or objects may be determined manually, automatically or semi-automatically." *Specification*, para. [37], lines 1-2. The operator can trace the outline of an object or objects with a computer mouse, stylus, light pen or other pointing device. *Specification*, para. [38], lines 1-2. The outline of the object may be selected on a pixel by pixel basis, applying "straight line or curve approximations, [B]ezier curves or best fit from a library of curves or generic shapes." *Specification*, para. [38], lines 2-4. To outline an object automatically, the computer may use characteristics such as "size, color, speed of motion, shading, brightness,

obscuration, and differences between previous and current and future images." *Specification*, para. [39], lines 1-3. For outlining an object semi-automatically, an operator can assist the computer by informing the computer about "the nature of the image where objects may be found." *Specification*, para. [40], lines 1-2. Also, an operator can use object outline information generated by another operator who considered the same image or who previously converted similar scenes in an image. Each of these techniques for outlining an object is an example of determining and defining an outline for the at least one object as recited in claim 1 and defining an outline of the object as called for in claim 27.

"The depth of an object or objects may be determined manually, automatically or semi-automatically." *Specification*, para. [44], lines 1-2. Depths of objects may be assigned using alphanumeric, visual, audible or tactile information such as by shading the object with a specific color (e.g. white for objects closest to a viewer and black for objects farther from a viewer) or numerical value (e.g. a range of 0 to 255 with 255 for objects closest to the viewer and 0 being assigned for objects farthest from the viewer). *Specification*, para. [44], lines 2-8 and para. [45].

Depth may be assigned manually by placing a "pointing device within the object outline and entering a depth value . . . as a numeric, alphanumeric or graphical value", semi-automatically or automatically "by the computer from a predetermined range of allowable values. The operator may also select the object depth from a library or menu of allowable depths." *Specification*, para. [46]; <u>see also</u> paras. [54] to [56]. Further, the operator may "assign a range of depths within an object or a depth range that varies with time, object location or motion" or a combination of thereof. *Specification*, para. [47], lines 1-2. Also, an operator can use depth definitions generated by another operator who considered the same image or who

previously converted similar scenes in an image. *Specification*, para. [58], lines 1-2. These processes of assigning depth support allocating a depth tag to an object as called for in claims 1 and 27. Depth definitions which are used may be simple ramps or linear variations or they be more complex than simple ramps or linear variations. *Specification*, paras. [49] to [53] and para. [63], lines 1-3.

The process of identifying or detecting objects, determining object outlines and assigning depths can be referred to as creating depth maps. *Specification*, para. [67], lines 1-2. Multiple ways exist to encode depth maps. *Specification*, para. [70], line 1. An example of encoding the object number (identifying tag as claimed), depth (depth tag as claimed), and object outline is provided in consideration of the outline of the person in Fig. 3. *Specification*, para. [70], lines 1-3. More specifically, as described in para. [70], lines 2-15:

> Consider the outline of a person shown in Figure 3. The person is allocated object number 1 with depth 20. The outline of the object has been determined as previously explained and at specific x,y locations. Typically, where a change in direction of the object outline takes place, a particular mark is made. This mark may be an alphanumeric character, a shape, color or other form of visual indication. Each of these marks will have a specific x,y location. In the preferred embodiment, this will be within the range 0 to 255. Between each pair of x,y locations will exist a curve. Each curve may be determined by selection from a library of all possible curve shapes. In the preferred embodiment, each curve will be given a value typically within the range -127 to +128 to enable the curve to be defined using one byte. Curves that progress clockwise from x,y location to the next x,y location may be assigned positive values, whilst those that progress counterclockwise may be assigned negative values. Other assignments may be applied.

This process and the remainder of para. [70] supports the step of encoding the identifying tag, the depth tag and the outline, of the least one object to produce a depth as recited in claim 1 and the

step of producing a depth map by encoding the depth tag and the outline of the object recited in claim 27.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

37 C.F.R. § 41.37(c)(1)(vi)

Claims 1-3, 13-14, 27, 32-33, and 43-44 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. patent no. 6,370,262 to Kawabata.

Claim 5 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Kawabata and U.S. patent no. 6,167,167 to Matsugu;

Claims 6-10 and 28-31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Kawabata and U.S. patent no. 6,029,173 to Meek;

Claims 11-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Kawabata and U.S. patent no. 5,793,900 to Nourbakhsh;

Claim 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Kawabata and U.S. patent no. 6,055,330 to Eleftheriadis; and

Claim 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kawabata alone.

ARGUMENT

37 C.F.R. § 41.37(c)(1)(vii)

Claims 1-3, 13-14, 23, 27, 32-33, and 43-44

The final office action, paper no. 05172006 ("final office action") maintains that Kawabata discloses all the elements of independent claims 1 and 27.

Kawabata is directed to an information processing apparatus using a distance measuring apparatus. Specifically, Kawabata describes acquiring distance information from a sensor and

then uses the distance information to identify distinct objects within an image. For example, in the "Field of the Invention" portion at col. 1, lines 7-11 Kawabata states "[t]he present invention relates to an object information processing apparatus having . . . a function to divide an object *depending upon distance information*, in extraction of object information." (Emphasis supplied).

Figs. 2A to 2E relied on by the final office action show "extraction of an object *from distance measurement data*." Col. 4, lines 1-2. (Emphasis supplied).

To anticipate a claim, a reference must show each and every claimed feature expressly or inherently. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). Claim 1 calls for, *inter alia*, identifying at least one object within a 2D image without using distance measurement data followed by allocating a depth tag to the at least one object. To show identifying at least one object within a 2D image, the final office action, on page 3 in numbered paragraph 4, relied on col. 6, lines 19-21 and Fig. 2A of Kawabata. Further to show identifying without using distance measurement data, the final office action, on page 2 in numbered paragraph 2, relied on col. 6, lines 25-53 and Figures 2B and 2C. Also, to show the step of allocating a depth tag, the final office action relied on col. 6, lines 21-24 and Fig. 2B of Kawabata.

On the contrary, appellants submit that Kawabata fails to teach or suggest identifying at least one object with a 2D image without using distance measurement data and then allocating a depth tag to the at least one object as recited in claim 1. Significantly, Kawabata requires the distance information (e.g., depth data) to be known before an object is even identified. Indeed this could not be clearer from Kawabata which unequivocally confirms, at col. 4, lines 1-4 in the Brief Description of the Drawings section, that "Figs. 2A to 2E are drawings to diagrammatically

show *extraction of an object from distance measurement data* and luminance information in the first embodiment of the present invention." (Emphasis supplied). The portion of Kawabata relied on to show the aforementioned features, col. 6, lines 18-53, pertains exclusively to the operation of extracting an object from distance measurement data and luminance information.

As stated at col. 6, lines 19-21 of Kawabata, Fig. 2A shows an original picture (30x20) with an object "O" on the right lower portion. Tellingly, the grey portion in Fig. 2A merely illustrates that an object is present. The final office action at page 2 in numbered paragraph 2 seems to equate the mere presence of the object as identifying the object. Appellants disagree. Identifying as understood by the skilled artisan involves identifying or determining the outline or shape of the object.

More specifically, Kawabata does not teach or suggest such identification in connection with Fig. 2A. Fig. 2B of Kawabata shows distance information that has been calculated by grouping the original images from the CCDs 3, 4 into units of 5x5 to obtain an image 6x4 of distance information (col. 6, lines 21-24). As set forth at col. 6, lines 27-30 of Kawabata, Fig. 2C shows that the "relationship between the shape of the object and distance information can be obtained". At col. 6, lines 44-49, Kawabata states that "[t]hus, for the blocks as determined as those of 2 m in FIG. 2B, it is determined from the data in the memory portion 14 which positions in the block correspond to the pixel portions in the above contour part. As a result, an image at the position in FIG. 2C is determined to be of 2 m". Significantly, one skilled in the art would appreciate that Kawabata determines the distance depth of various blocks, and then joins together blocks of the same depth. In this manner, Kawabata identifies the object using the distance (depth) information after having determined the depth data as opposed to identifying at least one

object within a 2D image without using distance measurement data followed by allocating a depth tag to the at least one object as recited in claim 1.

More particularly, the steps from Fig. 2A to Fig. 2C in Kawabata are as follows: 1) Fig. 2A shows the original image; 2) Fig. 2B shows the result of depth calculation within each block; and 3) in Fig. 2C the shape of the object is determined using the distance information previously calculated. Namely, in Kawabata the distance information is calculated in step 2 (Fig. 2B) prior to the object being identified in step 3 (Fig. 2C). Indeed, at col. 6, line 65 to col. 7, line 2 Kawabata states that "[a]s described above, it is possible to determine the 'shape of an object cut out as to the distance,' which permits the shape of an object to be discriminated as shown in FIG. 2E or FIG. 2C, from the distance image of rough blocks in FIG. 2B" with discriminating the shape of an object being tantamount to identifying an object. The identifying an object in Kawabata involves using distance measurement data. As such, Kawabata does not provide a teaching or suggestion of identifying at least one object within a 2D image *without using distance measurement data* followed by allocating a depth tag to the at least one object as called for in claim 1.

In summary, Fig. 2A is used to exemplify the process of Kawabata. Kawabata uses distance finders to determine the depth of each portion of an image. Once the depths are determined, areas of like depth are group together and the groups are then used to identify an object. Appellants submit that interpreting identifying an object as the mere presence of the object would be wholly inconsistent with Kawabata. Assuming, but not admitting, that the final office action's interpretation to be true, then Kawabata would suggest the following sequence of steps: 1) looking at an image and identifying the objects; 2) using a depth finder to determine

depths of each point of the image; 3) grouping the points that have the same depth; and 4) identifying the objects in the image using the groups. That is, the sequence of steps would identify the objects in the image and then go through a process to again identify those same objects. Such an interpretation would be non-sensical and inconsistent with the disclosure of Kawabata. Notably, it is clear from Kawabata that just because a user can see the objects in a Fig. 2A does not mean that the objects have been identified. In view of this further discussion, Kawabata neither teaches nor suggests identifying at least one object within a 2D image *without using distance measurement data* followed by allocating a depth tag to the at least one object as recited in claim 1.

Independent claim 27 calls for a method of encoding a depth map including, *inter alia*, allocating an object identifier to an object *without using distance measurement data* followed by allocating a depth tag to the object. The arguments set forth distinguishing claim 1 from Kawabata similarly apply to claim 27. Namely, for substantially the same reasons set forth with respect to claim 1, Kawabata neither teaches nor suggests allocating an object identifier to an object *without using distance measurement data* followed by allocating a depth tag to the object as recited in claim 27. Claims 2, 3, 13, 14, 23 and 43, which depend from claim 1, and claims 32, 33, and 44, which ultimately depend from claim 27, are allowable for at least the same reasons as their respective base claim.

Claim 5

To reject claim 5, which depends from claim 1, the final office action relies on the combination of Kawabata and Matsugu. However, even if proper, the combination does not result in the claim 5 invention. Specifically, Matsugu fails to overcome the deficiencies of

Kawabata with respect to claim 1 set forth above. That is, Matsugu lacks a teaching or suggestion of identifying at least one object within a 2D image *without using distance measurement data* followed by allocating a depth tag to the at least one object as called for in claim 1. As such claim 5 is patentably distinct from the combination of Kawabata and Matsugu.

Claims 6-10 and 28-31

To reject claims 6-10, which ultimately depend from claim 1, and claims 28-31, which ultimately depend from claim 27, the final office action relies on the combination of Kawabata and Meek. However the combination, even if proper, does not result in the inventions of claims 6-10 and 28-31. Specifically, Meek fails to overcome the deficiencies of Kawabata with respect to either claim 1 or claim 27 set forth above. That is, Meek lacks a teaching or suggestion of 1) identifying at least one object within a 2D image *without using distance measurement data* followed by allocating a depth tag to the at least one object as called for in claim 1; and 2) allocating an object identifier to an object *without using distance measurement data* followed by allocating a depth tag to the object as recited in claim 27. As such claims 6-10 and 28-31 are patentably distinct from the combination of Kawabata and Meek.

Claims 11-12

To reject claims 11 and 12, which each depend from claim 1, the final office action relies on the combination of Kawabata and Nourbakhsh. However, even if proper, the combination does not result in the claim 11 and 12 inventions. Specifically, Nourbakhsh fails to overcome the deficiencies of Kawabata with respect to claim 1 set forth above. That is, Nourbakhsh lacks a teaching or suggestion of identifying at least one object within a 2D image *without using distance measurement data* followed by allocating a depth tag to the at least one object as called

for in claim 1. As such claims 11 and 12 are patentably distinct from the combination of Kawabata and Nourbakhsh.

Claim 18

To reject claim 18, which depends from claim 1, the final office action relies on the combination of Kawabata and Eleftheriadis. However the combination, even if proper, does not result in the claim 18 invention. Specifically, Eleftheriadis fails to overcome the deficiencies of Kawabata with respect to claim 1 set forth above. That is, Eleftheriadis lacks a teaching or suggestion of identifying at least one object within a 2D image *without using distance measurement data* followed by allocating a depth tag to the at least one object as called for in claim 1. As such claim 18 is patentably distinct from the combination of Kawabata and Eleftheriadis.

CONCLUSION

For all of the foregoing reasons, Appellants respectfully submit that the final rejection of claims 1-3, 5-14, 18, 23, 27-33 and 43-44 is improper and should be reversed.

Respectfully submitted,
BANNER & WITCOFF, LTD.

Dated: February 27, 2007 By: /Gary D. Fedorochko/

Gary D. Fedorochko
Registration No. 35,509

1100 13th Street, N.W., Suite 1200
Washington, D.C. 20005-4051
Tel: (202) 824-3000
Fax: (202) 824-3001

GDF:lab

CLAIMS APPENDIX

37 C.F.R. § 41.37(c)(1)(viii)

1. (previously presented) A method of producing a depth map comprising the steps of:

identifying at least one object within a 2D image without using distance measurement data;

allocating an identifying tag to the at least one object;

allocating a depth tag to the at least one object;

determining and defining an outline for the at least one object; and

encoding said identifying tag, said depth tag and said outline, of said at least one object to produce a depth map.

2. (previously presented) The method as claimed in claim 1 wherein the object outline is defined by a series of co-ordinates, curves and/or geometric shapes.

3. (previously presented) The method as claimed in claim 1 or 2, wherein said identifying tag is a unique number.

5. (previously presented) The method as claimed in claim 1 or claim 2, wherein the step of determining the outline further includes tracing the at least one object pixel by pixel.

6. (previously presented) The method as claimed in claim 1 or claim 2, wherein the step of determining the outline further includes using straight lines to approximate the outline of the at least one object.

7. (previously presented) The method as claimed in claim 1 or claim 2, wherein the step of determining the outline further includes using curve approximations to approximate the outline of the at least one object.

8. (previously presented) The method as claimed in claim 1 or claim 2, wherein the step of determining the outline further includes using bezier curves to approximate the outline of the at least one object.

9. (previously presented) The method as claimed in claim 1 or claim 2, wherein the step of determining the outline further includes comparing the object with a library of curves and/or generic or geometric shapes to approximate the outline.

10. (previously presented) The method as claimed in claim 9 further including scaling the curve and/or generic or geometric shape to best fit the at least one object.

11. (previously presented) The method as claimed in claim 1, wherein the depth tag includes a color code.

12. (previously presented) The method as claimed in claim 1, wherein white represents one of objects relatively close to the viewer or objects relatively distant from the viewer and black represents the other of objects relatively close to the viewer and objects relatively distant from the viewer.

13. (previously presented) The method as claimed in claim 1, wherein said depth tag is a numerical value.

14. (previously presented) The method as claimed in claim 13, wherein said numerical value ranges from 0 to 255.

18. (previously presented) The method as claimed in claim 1 further including tracking the at least one object on successive frames of the image, and determining and assigning depth tags for the at least one object in each respective frame.

23. (previously presented) The method as claimed in claim 1, further including producing grayscale images that are at a lower resolution than said 2D image.

27. (previously presented) A method of encoding a depth map comprising:

allocating an object identifier to an object without using distance measurement data;

allocating a depth tag to said object;

defining an outline of the object; and

producing a depth map by encoding said depth tag and said outline of said object.

28. (previously presented) The method as claimed in claim 27, wherein said object outline is defined by a series of x,y coordinates, each x,y coordinate being separated by a curve.

29. (previously presented) The method as claimed in claim 28, wherein each said curve is stored in a library and allocated a unique number.

30. (previously presented) The method as claimed in claim 28 or claim 29, wherein said object outline also includes data on the orientation of each curve.

31. (previously presented) The method as claimed in claim 28 or claim 29, wherein each said curve is a bezier curve.

32. (previously presented) The method as claimed in claim 27, wherein said object outline is defined by at least one geometric shape.

33. (previously presented) The method as claimed in claim 32, wherein said at least one geometric shape is defined by the form of the shape and the parameters of the shape.

43. (previously presented) A method of converting 2D images into stereoscopic images applying a depth map generated according to the method of claim 1.

44. (previously presented) A method of converting 2D images into stereoscopic images applying an encoded depth map generated according to the method of claim 27.

EVIDENCE APPENDIX

37 C.F.R. § 41.37(c)(1)(ix)

None

RELATED PROCEEDINGS APPENDIX

37 C.F.R. § 41.37(c)(1)(x)

None